1. A multi-cyclic method of operating a water-gas shift (WGS) reactor comprising a copper-based WGS catalyst, the method comprising:

(a) heating the WGS catalyst in its oxidized state in a substantially dry, reducing gas comprising a reducing component to a temperature of 100 to 350 °C to form a reduced WGS catalyst;

(b) flowing a reactant gas comprising CO and H_2O through the reactor to contact the reduced WGS catalyst, while maintaining the WGS catalyst temperature at an operating temperature of 150 to 350 °C;

(c) purging the WGS reactor with a substantially dry, first non-oxidizing gas at the operating temperature, and allowing the WGS catalyst temperature to fall below the operating temperature;

(d) heating the WGS catalyst to the operating temperature in a substantially dry, second non-oxidizing gas; and

(e) repeating (b) through (d) at least two times.

2. The multi-cyclic method of claim 1, wherein the reducing component in the reducing gas of (a) comprises at least 1% by volume of CO, H_2, or a mixture thereof.

3. The multi-cyclic method of claim 2, wherein the reducing gas of (a) is derived from an upstream reformer reactor operating in catalytic partial oxidation mode.

4. The multi-cyclic method of claim 1, wherein the substantially dry, first and second non-oxidizing gases consist essentially of at least one of nitrogen, argon, de-sulfured gaseous hydrocarbon, carbon dioxide, carbon monoxide and hydrogen.

5. The multi-cyclic method of claim 1, wherein the substantially dry, first non-oxidizing gas has the same composition as the substantially dry, second non-oxidizing gas.

6. The multi-cyclic method of claim 1, wherein the reactant gas of (b) further comprises at least 10% by volume H_2, on a dry basis.

7. The multi-cyclic method of claim 1, wherein the copper-based, WGS catalyst comprises from 5 to 20 wt.% of a copper component, wherein at least 50 wt.% of the copper component is in the form of a copper oxide, aluminum oxide spinel; and at least 75 wt.% of alumina.

8. The multi-cyclic method of claim 7, wherein in (a), the WGS catalyst in its oxidized state is heated in the reducing gas at a temperature below 300 °C to form the reduced WGS catalyst.

9. The multi-cyclic method of claim 7, wherein in (b), the reduced WGS catalyst is contacted with the reactant gas, while maintaining the WGS catalyst temperature at an operating temperature of 180 to 300 °C.

10. A multi-cyclic method of operating a water-gas shift (WGS) reactor comprising a copper-based WGS catalyst, the method comprising:

(a) heating the WGS catalyst in its oxidized state in a reducing gas comprising a reducing component to a temperature of 150 to 350 °C to form a reduced WGS catalyst;

(b) flowing a reactant gas comprising CO and H_2O through the reactor to contact the reduced WGS catalyst, while maintaining the WGS catalyst temperature at an operating temperature of 180 to 300 °C;

(c) purging the WGS reactor with a substantially dry, first non-oxidizing gas at the operating temperature, and allowing the WGS catalyst temperature to fall below the operating temperature;

(d) heating the WGS catalyst to the operating temperature in a substantially dry, second non-oxidizing gas; and

(e) repeating (b) through (d) at least two times;

wherein the copper-based, WGS catalyst comprises from 5 to 20 wt.% of a copper component, wherein at least 50 wt.% of the copper component is in the form of a copper oxide, aluminum oxide spinel; and at least 75 wt.% of alumina.

11. The multi-cyclic method of claim 10, wherein the copper-based, WGS catalyst further comprises from 0.03 to 1 wt.% of carbonaceous residue.

12. A catalyst comprising:
from 5 to 20 wt.% of a copper component, wherein at least 50 wt.% of the copper component is in the form of a copper oxide, aluminum oxide spinel;
at least 75 wt.% of alumina; and
from 0.03 to 1 wt.% of carbonaceous residue.

13. A method of conducting the water-gas shift reaction comprising:
contacting a reactant gas stream comprising CO and H_2O with a WGS catalyst to form H_2 and CO_2;
wherein the WGS catalyst comprises:
from 5 to 20 wt.% of a copper component, wherein at least 50 wt.% of the copper component is in the form of a copper oxide, aluminum oxide spinel;
at least 75 wt.% of alumina; and
from 0.03 to 1 wt.% of carbonaceous residue.